Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of:	)	
	)	
The Amendment of Part 97 of the Commission's Amateur Radio Service Rules to Clarify Digital Data Communications	)	RM-_____
	)	
By: W. Lee McVey, PE Ret.	)	
	)	
To: The Chief, Wireless Telecommunications Bureau	)	
	)	

PETITION FOR EXPEDITED RULEMAKING

Comes now, W. Lee McVey, PE Ret., licensee of amateur radio station W6EM, who respectfully requests the Commission to issue a *Notice of Proposed Rule Making* at the earliest possible date, in order to address the regulatory ambiguity with respect to digital data modes in the Amateur Service.

To date, two Petitions for Rulemaking have been filed that address some elements of digital data codes across the Amateur Service. However, as of this filing, the Commission has yet to initiate a Rulemaking Proceeding. Since those filings, information has surfaced which alleges at least abuse, if not outright unlawful activity using digital data conduits on the high frequency (HF) amateur bands.[1] Additionally, there is a growing need to address the incompatibility of certain data codes with other popular modes within the CW, data and radio teletype (RTTY) HF allocations. It has been observed that transient bandwidth characteristics of certain data codes can suddenly obliterate ongoing adjacent communications without warning. This Petition will attempt

[1] Comments of Janis A. Carson, RM-11708 and RM-11769, pages 3 and 4.

to address some of what I believe are critical issues and recommended solutions, which I believe justify an expeditious Rulemaking process.

Background

RM-11708, filed on November 15, 2013 by the American Radio Relay League (ARRL), proposes expansion of data throughput rates in the HF bands. A more recently filed Petition by James Whedbee, designated as RM-11769, proposes the outright removal of existing constraints on digital data codes, allowing them to be used anywhere in present CW/DATA/RTTY assignments leaving only a bandwidth constraint. There is presently a 300 baud symbol rate restriction that is longstanding and designed to primarily limit bandwidth of RTTY emissions.[2] But, it does not fit well with many digital codes used to transfer large blocks of data. While it is appropriate as a bandwidth constraint for frequency shift keying (FSK) modes such as RTTY, it unnecessarily limits other data code transmission speed and efficiency in the HF amateur bands. It applies to all bands, except for automatic data stations outside of dedicated spectrum and one channel in the 60 meter band.[3] Technology has evolved to the point where some data codes can efficiently compress information within 2.8 to 3.3kHz bandwidths at symbol rates far above the 300 baud codified limit.[4]

The Commission has long recognized that digital codes could be used to cipher or otherwise limit interception of communications. Such codes could be used over great distances to send and receive coded transmissions that might aid those who wish to harm the United States or its citizens. In addressing this national security concern, its intention has been to limit data codes on the HF bands to those which have completely released their protocol definitions to the public. It defines those as Specified Codes, (SC) and restricts HF data communications to only those codes.[5] Other codes that are not fully public are defined as Unspecified Codes (UC) and are restricted to VHF and UHF allocations. Although the meaning seems unambiguous, some think that the release of a

[2] §97.307(f)3.
[3] §97.307(f)14(i)
[4] The copyright holder for PacTOR IV claims a much higher symbol rate is possible.
[5] §97.309(a)4 lists only some of those modes, and its inclusion of PacTOR without further clarification is errant.

flow chart of code information flow is equivalent to a complete code specification. It is not. This confusion has been exploited to the point that some think that codes PacTOR II, PacTOR III and recently PacTOR IV somehow meet the requirements for being SCs. With little effort, one can discover that SCS GmBH, the copyright and patent owner of versions II, III, and IV, *has not and will not release the protocol specification definition and mathematical modulation functions* in sufficient detail so that other manufacturers or amateurs themselves can construct modem equipment and firmware to utilize or monitor any of these PacTOR versions, except PacTOR I. Part of the reason for this confusion lies in the §97.309(a)4 list since PacTOR is designated an SC. However, the only PacTOR code that has had its protocol fully released to the public domain is what is now known by amateurs as PacTOR I.[6]

There are many digital data codes with fully released characteristics and public domain freeware. Most popular with amateur operators are keyboard codes such as JT-65 and PSK-31 which are very narrow in bandwidth and most importantly, stay within a defined, relatively constant bandwidth of less than 500Hz when in use. Problematic for amateurs operating nearby are codes which employ Orthogonal Frequency Division Multiplexing (OFDM), (2K80J2D to 3K30J2D) which by its nature, may not be constant bandwidth. OFDM modes can employ means to increase bandwidth suddenly and unpredictably. Expanding from perhaps less than 1kHz to as wide as 3.3kHz. OFDM consists of a pattern of equal amplitude subcarriers, equally spaced apart from the carrier frequency in a single, suppressed-carrier sideband. The number of subcarriers is designed to increase under bettering signal conditions when lower error rates are encountered. There are several publicly released OFDM codes, including CLOVER, OLIVIA, MT-63 and STANAG 5066/2G-ALE.

Discussion

Clearly, there is need for data definition refinement to address usage trends in data codes. Automatic stations that are used to transfer voluminous content from point to point are

[6] Even more confusion has been generated by using ARRL's suggestion of UC PacTOR III as an exemplar OFDM mode in the 60M allocation table at §97.307(f)14.

presently restricted to small segments on each HF band. For the most part, these stations employ OFDM coding to most efficiently transfer data. However, there are issues with use of some these codes as stated above, not the least of which is need for very accurate carrier frequency alignment. Simply stated, tolerances typically less than 100Hz are required in order that signals can be properly detected and subcarriers aligned to where predicted. As such, a channel frequency is most often pre-selected so as to allow accurate transfer of content. And, again, the potential for bandwidth expansion presents issues for any stations operating nearby. Practically speaking, unless an amateur station has spectral analysis display capability, or an OFDM-mode-capable modem, it cannot discern whether or not an adjacent communication is or is not OFDM coding. And, likely unaware of the impending peril of initiating communications anywhere near the signal envelope.

The existing rationale for constraint of automatic, unattended OFDM stations should continue, but their operation should only be permitted in the existing segments and not allowed elsewhere. As it stands now, automatic stations can only operate elsewhere when emission bandwidths are constrained to 500Hz or less.[7] This essentially removes frequency limits for non-OFDM automatic and relay data codes which have predictable bandwidths. And, rightfully so.

OFDM is rarely used as just a keyboard code. The speed of throughput isn't an issue when typing at a keyboard. Since there is little justification for OFDM unless passing large data file blocks, its use should be restricted to what are now the segments of each HF band reserved for automatic stations. Again, primarily because of the possibility of unpredictable transient bandwidth expansion in the vicinity of other two-way communications.

Transmission of third party traffic is an important purpose of the Amateur Service. Especially so during and following disasters and national emergencies. However, with the use of high capacity OFDM data codes to handle third party traffic, there has been demonstrated abuse.[8] There should be limits placed on the amount and nature of content

[7] §97.221(c)2
[8] Carson Comments, pages 3 and 4.

allowed to be relayed. Especially since the majority of amateurs cannot decode OFDM signals without expensive, proprietary modems; content cannot be easily examined by others to identify whether or not it is appropriate.

Proposed Modifications to Part 97 Sections

The following are proposed revisions that will clarify and resolve the issues presented above:

§97.305(f) The following standards and limitations apply to transmissions on the frequencies specified in §97 .305(c) of this part.

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(3)~~Only a~~ A RTTY or data emission using a specified digital code listed in § 97.309(a) of this part may be transmitted; except that automatic stations and codes employing Orthogonal Frequency Division Multiplex (OFDM) are limited to the segments in §97.221(b). ~~The symbol rate must not exceed 300 bauds, or for frequency shift keying, the frequency shift between mark and space must not exceed 1kHz.~~ The authorized bandwidth, as defined by § 2.202(a), is 2.8 kHz.

(4) A RTTY or data emission using a specified digital code listed in § 97.309(a) of this part may be transmitted; except that automatic stations and codes employing Orthogonal Frequency Division Multiplex (OFDM) are limited to the segments in §97.221(b). ~~The symbol rate must not exceed 1200 bauds, or for frequency shift keying, the frequency shift between mark and space must not exceed 1kHz~~. The authorized bandwidth, as defined by § 2.202(a), is 2.8 kHz.

(5) A RTTY, data or multiplexed emission using a specified digital code listed in § 97.309(a) of this part may be transmitted. ~~The symbol rate must not exceed 19.6 kilobauds.~~ A RTTY, data or multiplexed emission using an unspecified digital code under the limitations listed in§ 97.309(b) of this part also may be transmitted. The authorized bandwidth as defined by § 2.202(a), is 20 kHz.

(6) A RTTY, data or multiplexed emission using a specified digital code listed in § 97.309(a) of this part may be transmitted. ~~The symbol rate must not exceed 56 kilobauds.~~ A RTTY, data or multiplexed emission using an unspecified digital code under the limitations listed in § 97.309(b) of this part also may be transmitted. The authorized bandwidth as defined by § 2.202(a), is 100 kHz.

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§97.307(f)

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(14) In the 60 m band:

(i) A station may transmit only phone, RTTY, data, and CW emissions using the emission designators and any additional restrictions that are specified in the table below (except that the use of a narrower necessary bandwidth is permitted):

60 M Band Emission Requirements

Emission type	Emission designator	Restricted to:
Phone	2K80J3E	Upper sideband transmissions (USB).
Data	2K80J2D	USB (for example, ~~PACTOR-III~~ OLIVIA).
RTTY	60H0J2B	USB (for example, PSK31).
CW	150HA1A	Morse telegraphy by means of on-off keying.

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47 CFR § 97.309(a) Where authorized by §§ 97.305(c) and 97.307(f) of the part, an amateur station may transmit a RTTY or data emission using the following specified digital codes:

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(4) An amateur station transmitting a RTTY or data emission using a digital code specified in this paragraph may use any technique whose technical characteristics have been documented publicly, such as CLOVER, G-TOR, OLIVIA, JT-65, ~~or~~ PacTOR I, PSK-31 or STANAG 5066 for the purpose of facilitating communications.

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Respectfully Submitted,

/s/

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Life Senior Member, Institute of Electrical and Electronic Engineers (IEEE)
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